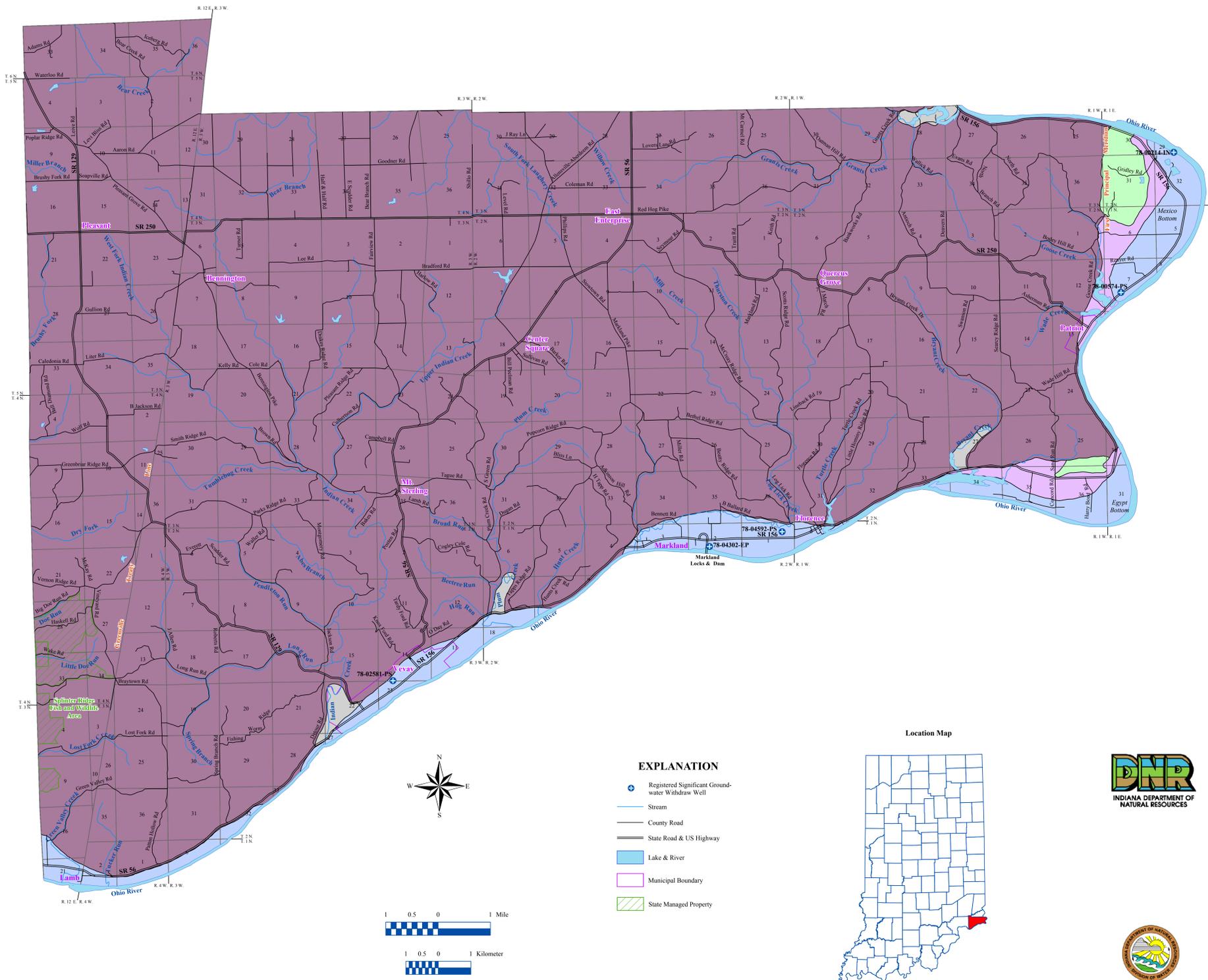


# UNCONSOLIDATED AQUIFER SYSTEMS OF SWITZERLAND COUNTY, INDIANA



Five unconsolidated aquifer systems are mapped in Switzerland County: the Dissected Till and Residuum, the Alluvial, Lacustrine, and Backwater Deposits, the Buried Valley, the Ohio River Outwash, and the Ohio River Outwash Subsystem. Boundaries of these aquifer systems are commonly gradational, and individual aquifers may extend across aquifer system boundaries. However, in areas where the topography is steep, boundaries between aquifer systems are more distinct.

Thickness, type, and aerial extent of unconsolidated sediments in Switzerland County are variable. Pre-Wisconsin glacial sediments and bedrock residuum extend across most of the county. Wisconsin Age and younger outwash, alluvial, and lacustrine sediments are confined to the Ohio River Valley and its tributaries. Sediments that overlie bedrock range from less than five feet thick in areas where only residuum or thin glacial drift is present, to as much as 180 feet thick in the northeastern part of the county near Mexico Bottoms. In this area glacially derived silt, outwash, alluvial, and lacustrine deposits have filled part of the Ohio River Valley.

Regional estimates of aquifer susceptibility to contamination from the surface can differ considerably from local reality. Variations within geologic environments can cause variation in susceptibility to surface contamination. In addition, man-made structures such as poorly constructed water wells, unplugged or improperly abandoned wells, and open excavations, can provide contaminant pathways that bypass the naturally protective clays.

## Dissected Till and Residuum Aquifer System

The Dissected Till and Residuum Aquifer System is mapped over most of Switzerland County. It is the most limited ground-water resource of the five unconsolidated aquifer systems in the county.

This aquifer system consists of extremely thin pre-Wisconsin till deposits with very thin layers of outwash sand and gravel, or thin, eroded bedrock residuum. Thickness of these sediments generally range from less than 5 feet (where only residuum is present) to about 40 feet. Potential aquifer materials consist of thin sand and gravel deposits that are typically less than 5 feet thick.

Because this aquifer system is generally thin and not very productive, most drillers prefer to complete wells in the underlying bedrock aquifer system. However, large diameter bucket wells may be successful in meeting the needs of some domestic users. Well capacities are typically less than 5 gallons per minute (gpm) with dry holes common.

Because of the low permeability of the surface materials, this aquifer system is not very susceptible to contamination from surface sources.

## Alluvial, Lacustrine, and Backwater Deposits Aquifer System

In Switzerland County the Alluvial, Lacustrine, and Backwater Deposits Aquifer System is mapped along portions of larger tributaries of the Ohio River. These include: Grants Creek in the northeast portion of the county; Bryant Creek in the southeast portion of the county; Plum Creek in the south-central portion of the county; and Indian Creek in the southwest portion of the county.

This system consists of deposits that come from two primary sources. The first is alluvium deposited by streams along with colluvium eroded from valley walls and upland areas. The second is from pre-Wisconsin and Wisconsin fine-grained glaciolacustrine deposits formed in relatively static lake water. Typical materials include fine sand, silt, and clay deposits that are commonly greater than 25 feet thick. Aquifer materials typically include thin sand seams that are generally less than five feet thick. This aquifer system is a limited resource and there are no known wells that actually produce from these deposits. However, large diameter bored (bucket-ribs) wells may be adequate to supply the needs of some domestic users.

Thick deposits of silt and clay that have a low susceptibility to surface contamination generally mark this aquifer system. The susceptibility is greater in areas where the surficial silt and clay deposits are thin and directly overlie outwash deposits.

## Buried Valley Aquifer System

Two small areas of northeastern and southeastern Switzerland County are mapped as the Buried Valley Aquifer System. In these areas pre-Wisconsin glacial outwash deposits filled the Ohio River Valley and were then subsequently buried by thick pre-Wisconsin glacial till and lacustrine deposits. There are no reported water wells completed in the Buried Valley Aquifer System. However, several soil borings penetrate through the unconsolidated materials to bedrock and provide some indication of aquifer potential.

Total thickness of unconsolidated deposits overlying bedrock is as much as 180 feet in places. The buried outwash deposits are up to 115 feet of continuous sands and gravels and are capped by clay and lacustrine deposits up to 90 feet thick. However, some borings report interbedded clay materials up to 45 feet thick that disrupt the continuity of the sands and gravels. Because thick aquifer materials are available in the Buried Valley Aquifer System and are likely connected to the adjacent outwash system/subsystem, this system has the potential to meet the needs of domestic and some high-capacity users.

Potential for contamination is low due to thick clay and lacustrine deposits that overlie the aquifer sands and gravels.

## Ohio River Outwash Aquifer System

The Ohio River Outwash Aquifer System in Switzerland County is mapped along most of the main valley of the Ohio River. Aggradation of the Ohio River Valley with large amounts of outwash sand and gravel from pre-Wisconsin and Wisconsin receding glaciers filled the river valley. Subsequent recent alluviation continued to fill the valley. These outwash and alluvial deposits form the most prolific aquifer system in the county.

This system is nearly 160 feet thick in places with up to 150 feet of continuous sand and gravel. Typical outwash thickness, however, ranges from 40 to 75 feet. Thickness of saturated sands and gravels can be as much as 95 feet but are typically 25 to 55 feet. Well depths are commonly 55 to 105 feet. In some areas 10 to 30 feet of sandy clay or silt overlie the aquifer materials.

The Ohio River Outwash Aquifer System has the greatest potential of any aquifer system in Switzerland County and can meet the needs of domestic and high-capacity users. Domestic well yields range from 10 to 30 gpm and static water levels are generally 25 to 60 feet below surface. There are five registered high-capacity facilities (12 wells) in this system. Reported well capacities are up to 3300 gpm, but are typically 350 to 2300 gpm.

In areas that lack overlying clays, this aquifer system is highly susceptible to contamination from surface sources. Where clay or silt deposits overlie the aquifer system, the aquifer is moderately susceptible to surface contamination.

## Ohio River Outwash Aquifer Subsystem

The Ohio River Outwash Aquifer Subsystem is mapped along two areas in eastern Switzerland County. In general, this system (subsystem) is mapped parallel and adjacent to the Ohio River Outwash Aquifer System where the topographic position is higher and thickness of saturated outwash materials is considerably less than the main outwash system. Also, aquifer sand and gravels are generally overlain by greater thicknesses of silt, clay, or lacustrine deposits.

Thickness of unconsolidated materials overlying bedrock within this system range from about 70 to 130 feet with up to 35 feet of continuous sand and gravel. There are very few reported wells utilizing this system in Switzerland County. However, other counties where the Ohio River Aquifer Subsystem is mapped suggest that the subsystem in Switzerland County has the potential to meet the needs of domestic and some high-capacity users.

Areas within this aquifer system that have overlying clay or silt deposits are moderately susceptible to surface contamination; whereas, areas that lack overlying clay or silt deposits are highly susceptible to contamination.

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This map was created from several existing shapefiles. Township and Range Lines of Indiana (line shapefile, 20020621), Land Survey Lines of Indiana (polygon shapefile, 20020621) and County Boundaries of Indiana (polygon shapefile, 20020621), were from the Indiana Geological Survey and based on a 1:24,000 scale. Draft road shapefiles, System1 and System2 (line shapefiles, 2003), were from the Indiana Department of Transportation and based on a 1:24,000 scale. Populated Areas in Indiana 2000 (polygon shapefile, 20021000) was from the U.S. Census Bureau and based on a 1:100,000 scale. Streams27 (line shapefile, 20000420) was from the Center for Advanced Applications in GIS at Purdue University. Managed Areas 96 (polygon shapefile, various dates) was from IDNR. Unconsolidated Aquifer Systems coverage (Maier, 2005) was based on a 1:24,000 scale.

## Unconsolidated Aquifer Systems of Switzerland County, Indiana

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